WHAT IS CLAIMED IS:

1. A particle-measuring system,

provided in a processing system for generating an atmosphere including atmospheric air or a gas exhausted from within a processing chamber by a vacuum pump, and for processing an object relating to a semiconductor manufacturing in this atmosphere, and

installed on an exhaust pipe that connects between an exhaust opening of the processing chamber and the vacuum pump, for measuring the number of particles included in the exhaust gas.

2. The particle-measuring system according to claim 1, comprising:

a laser beam irradiator for irradiating laser beams to within the exhaust pipe along a line connecting between a center point of a cross section of the exhaust pipe and a center axis passing vertically through a center of the processing chamber; and

a scattered light detector provided in a direction approximately orthogonal with an irradiation direction of the laser beams, for detecting scattered lights from the particles.

3. The particle-measuring system according to claim 2, wherein

the laser beam irradiator irradiates laser beams onto a portion of high density of particles included in an exhaust gas exhausted from within the exhaust pipe,

and

the scattered light detector directs a detection direction to the portion of high density of particles included in the exhaust gas exhausted from within the exhaust pipe, in a direction approximately orthogonal with the irradiation direction of the laser beams.

4. The particle-measuring system according to claim 2, wherein

a center of the scattered light detector is set to direct to a point offset by a predetermined distance from the center point of the cross section of the exhaust pipe in a direction opposite to a direction in which the center axis passing vertically through the center of the processing chamber is positioned.

5. The particle-measuring system according to claim 1, comprising:

a laser beam irradiator for irradiating laser beams so that the laser beams are transmitted through a point offset by a predetermined distance from the center point of the cross section of the exhaust pipe in a direction opposite to a direction in which the center axis passing vertically through the center of the processing chamber is positioned; and

a scattered light detector provided in a direction approximately orthogonal with an irradiation direction of the laser beams, for detecting scattered lights from the particles.

6. The particle-measuring system according to claim 4, wherein

a maximum value of the predetermined offset distance is 0.75 times the radius of the exhaust pipe.

7. The particle-measuring system according to claim 5, wherein

a maximum value of the predetermined offset distance is 0.75 times the radius of the exhaust pipe.

8. The particle-measuring system according to claim 1, wherein the exhaust pipe is installed at a position

where light generated within the processing chamber do not reach position, a distance from the processing chamber is minimum, and there are high and low densities of particle included in the exhaust gas within the exhaust pipe.

9. A particle-measuring method for measuring the number of particles included in an exhaust gas exhausted from a processing system for generating an atmosphere including atmospheric air or a gas exhausted from within a processing chamber by a vacuum pump, and for processing an object relating to a semiconductor manufacturing in this atmosphere,

the method comprising the steps of:

modeling parameters;

carrying out a numerical simulation for expressing trajectory of an exhaust gas that includes particles

flowing through an exhaust pipe;

carrying out a trajectory numerical simulation of an exhaust gas and particles;

confirming an optimum position for measuring particles;

determining sensor installation position;

installing the sensor; and

evaluating a measurement of particle,

wherein trajectory of particles that flow through the exhaust pipe after the particles have been generated inside the processing chamber and exhausted from the processing chamber are simulated, to select an area where the density of the particles is the highest in the radial direction of the exhaust pipe, a laser beam irradiator is disposed at a position in this area where laser beams for measurement pass through, and a scattered light detector is disposed in a direction orthogonal with the laser beams, thereby to measure the particles.

2 10. The particle-measuring method according to claim 9, 1 wherein

the step of modeling parameters comprises the steps of:

modeling an exhaust configuration based on a shape of the chamber, a configuration of the exhaust pipe and a piping layout of the exhaust pipe;

modeling processing conditions including a kind of

a gas, a pressure, a flow rate, and temperature;

modeling particle conditions including a composition, a density and sizes of particles generated; and

modeling constructional members and a position for generating the particles.

13. The particle-measuring method according to claim 9, wherein the trajectory numerical simulation is obtained based on the number of openings of exhaust pipes provided in the chamber, their shapes, their layout positions, and a flow rate of the exhaust gas.

12. A particle-measuring system, provided in a processing system for generating an atmosphere including atmospheric air or a gas exhausted from within a processing chamber by a vacuum pump, and for processing an object relating to a semiconductor manufacturing in this atmosphere,

the particle-measuring system comprising:

a sensor manifold installed in air-tight in front of the vacuum pipe in the middle of the exhaust pipe connected to the processing chamber, and having a rotating mechanism;

a laser beam irradiator installed on the sensor manifold, and having a driving mechanism movable in a radial direction of the exhaust pipe;

a beam stopper installed on the sensor manifold opposite to the laser beam irradiator, and having a

driving mechanism movable in a direction to face straight the laser beam irradiator, for receiving irradiated laser beams; and

a scattered light detector installed on the sensor manifold in a direction approximately orthogonal with the irradiation direction of the laser beams, and having a driving mechanism movable in two-dimensional directions, for detecting the laser light scattered by the particles;

a position controller for operating the driving mechanisms of the laser beam irradiator and the beam stopper so that the laser beams pass through an area in which the density of the particles is high in the sensor manifold assumed by simulation, and for moving the scattered light detector to a position for detecting scattered lights from the high-density area; and

a controller/processor for controlling the laser beam irradiator and the scattered light detector and for processing a measurement result obtained.

13. The particle-measuring system according to claim 12, wherein each driving mechanism has a motor or a linear motor as a driving source.

14. The particle-measuring system according to claim 12, wherein the sensor manifold is connected in airtight to the exhaust pipe so as to be rotatable around the exhaust pipe by a magnetic fluid seal.

8

15. A particle-measuring method for measuring the number of particles included in an exhaust gas exhausted from a processing system for generating an atmospheric air or a process gas exhausted from within a processing chamber by a vacuum exhaust system, and for processing an object relating to a semiconductor manufacturing in this atmosphere, the particle measuring method using a system having a laser irradiator, a scattered light detector and a beam stopper for measuring the number of particles by irradiating laser beams to particles generated within the processing chamber,

the particle-measuring method comprising the steps of:

selecting an area in which the density of particles is high by carrying out a simulation based on information on constructional members including the processing chamber and other members disposed inside the processing chamber, information on the vacuum exhaust system, and information on the process gas;

adjusting a position of the laser beam irradiator so that the laser beam irradiator can irradiate laser beams in an area in which the density of particles is high based on the simulation;

adjusting a position of the beam stopper to face the laser irradiator so that the beam stopper can receive laser beams passed through the high-density

area;

adjusting a position of the scattered light detector so that the scattered light detector can detect scattered lights of the laser beams passed through the high-density area;

irradiating by the laser irradiator the laser beams to an area in which the density of particles is high;

detecting by the scattered light detector the scattered lights of the laser beams passed through the high-density area; and

calculating the number of particles from the scattered lights detected.

16. A particle-measuring method for measuring the number of particles included in an exhaust gas exhausted from a processing system for generating an atmospheric air or a gas exhausted from within a processing chamber by vacuum exhausting, the particle measuring method for measuring particles using a particle-measuring system having a laser position adjusting unit,

the particle-measuring method comprising the steps of:

determining an optimum position of installing a sensor by simulation, and inputting the installation position information to a position controller of the laser position adjusting unit;

inputting processing conditions to the position controller of the laser position-adjusting unit;

adjusting by the position controller a laser beam irradiator, a scattered light detector, a beam stopper and a sensor manifold to optimum positions respectively; and

measuring by the sensor particles generated within the processing chamber.

17. The particle-measuring system according to claim 1, wherein processing chamber has a wall, the exhaust opening is made in a given part of the wall, the exhaust pipe extends horizontally, vertically or slantwise, and a trajectory of particles is simulated with respect to a direction in which air or gas is exhausted through the exhaust pipe.